In the United States Court of Federal Claims

No. 12-303C

(Filed Under Seal: April 25, 2014)
(Reissued: May 2, 2014)

*********************************)		Patent case; eligibility for patent
)		protection under 35 U.S.C. § 101;
HITKANSUT LLC, a Michigan)		application of the Larson-Miller variant
corporation, & ACCELEDYNE)		of the Arrhenius equation; ineligibility
TECHNOLOGIES, LTD., LLC, a)		of mathematical formulae for patent
Michigan corporation,)		protection; eligibility of novel means
)		of applying a natural law to obtain more
Plaintiffs,)		efficient and beneficial results
)		
v.)		
)		
UNITED STATES,)		
)		
Defendant.)		
)		
********************************		

John S. Artz, Dickinson Wright, PLLC, Troy, Michigan, for plaintiffs. With him on the briefs were John A. Artz, and Bryan J. Schomer, Dickinson Wright, PLLC, Troy, Michigan.

Gary L. Hausken, Assistant Director, Commercial Litigation Branch, Civil Division, United States Department of Justice, Washington, D.C., for defendant. With him on the briefs were Stuart F. Delery, Acting Assistant Attorney General, and John Fargo, Director, Commercial Litigation Branch, Civil Division, United States Department of Justice, Washington, D.C. Of counsel was Benjamin S. Richards, United States Department of Justice, Washington, D.C.

OPINION AND ORDER[1]

LETTOW, Judge.

Following claim construction in this patent case, the government has moved for summary judgment, asserting that the claims, as construed, are ineligible for patent protection because they relate to nonstatutory subject matter. Def.'s Mot. for Summary Judgment of Invalidity of U.S. Patent No. 7,175,722 as Claiming Nonstatutory Subject Matter Under 35 U.S.C. § 101 ("Def.'s

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[1]Because this opinion and order might have contained confidential or proprietary information within the meaning of Rule 26(c)(1)(G) of the Rules of the Court of Federal Claims ("RCFC") and the protective order entered in this case, it was filed under seal. The parties were requested to review this decision and to provide proposed redactions of any confidential or proprietary information. No redactions were requested.

Mot."), ECF No. 42. Plaintiffs Hitkansut LLC and Acceledyne Technologies, Ltd. LLC (collectively, "Hitkansut") resist this motion and defend the patentability of their claims for structural processing methods in U.S. Patent No. 7,175,722 ("the '722 patent"). *See* Pls.' Opp'n to Def.'s Mot. for Summary Judgment & Cross-Mot. for Summary Judgment ("Pls.' Cross-Mot."), ECF No. 43.[2]

BACKGROUND

Hitkansut asserts that the patent applicant, Ms. Donna Walker, invented

a unique method for improving the mechanical and physical properties of manufactured metal parts (strength, durability, longevity, etc.) and to do so in a much faster way (minutes vs. hours; hours vs. days) and with much less use of energy (tens of BTUs vs. thousands of BTUs). The method generally includes subjecting the manufactured metal parts ("structures") to two separate and overlapping energy sources [*e.g.*,] heat and vibration, or heat and magnetism) under certain conditions until the state of activation energy of the metals parts ha[s] been met.

Pls.' Cross-Mot. at 3. Ms. Walker was granted the '722 patent on February 13, 2007.[3] The patent consists of fourteen claims, seven of which are in dispute in this case. *See Hitkansut LLC v. United States*, 114 Fed. Cl. 410, 413 (2013) ("*Hitkansut II*") (claim construction opinion). Of those seven claims, Claims 1, 7, 11, and 14 are independent claims, while Claims 2, 6, and 8 are dependent claims. *Id.* at 413 n.3. Hitkansut alleges that Oak Ridge and its partners are using the method and thus infringing the process set forth in the claims of the patent. *See* Compl. ¶¶ 22, 45.[4]

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[2]In its complaint, Hitkansut alleges that the United States, acting through Oak Ridge National Laboratory ("Oak Ridge" or "the government"), has infringed upon claims 1, 2, 6, 7, 8, 11, and 14 of the '722 patent and thus is liable for damages under 28 U.S.C. § 1498(a). Compl. ¶¶ 1, 10.

[3]The '722 patent is contained in the electronic record of proceedings in this case at ECF No. 23-2.

[4]Hitkansut alleges that Oak Ridge employs a thermomagnetic processing means in certain research and in contractual cooperative research and development agreements ("CRADAs") with private entities, and that those contracts and the work under those contracts infringe the patent. *See Hitkansut LLC v. United States*, 111 Fed. Cl. 228, 231 (2013) ("*Hitkansut I*") (resolving disputes over production in discovery of information relating to the CRADAS). Specifically, Hitkansut asserts that Ms. Walker disclosed her inventive process to Oak Ridge employees while serving as a guest researcher there from 2003 to 2005. *Hitkansut II*, 114 Fed. Cl. at 415. The possibility of a collaborative research effort was discussed, but ultimately no agreement to that end was reached. *Id.*

On July 9, 2012, the government responded to the complaint by denying the infringement allegations in Hitkansut's complaint. Def.'s Answer, ECF No. 7. Discovery was then undertaken, and in due course, the parties filed briefs regarding disputed terms of the claims at issue. On May 2, 2013, this court held a claim-construction hearing, and on July 31, 2013, it issued its resulting constructions of the pertinent claim terms. *See Hitkansut II*, 114 Fed. Cl. 410. On September 13, 2013, the government filed its motion for summary judgment, asserting that the '722 patent is invalid because its claims seek to patent nonstatutory subject matter under 35 U.S.C. § 101. Hitkansut's cross-motion seeks a declaration that the claims are eligible for patent protection. A hearing on the merits was held on January 14, 2014.[5]

STANDARD FOR DECISION

RCFC 56 states that "[t]he court shall grant summary judgment if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." RCFC 56(a). A fact is material if it "might affect the outcome of the suit under governing law," *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986), and an issue is genuine if it "may reasonably be resolved in favor of either party," *id.* at 250. The moving party bears the initial burden of demonstrating the absence of any genuine issue of material fact. *Celotex Corp. v. Catrett*, 477 U.S. 317, 323 (1986). The moving party may discharge its burden by "pointing out . . . that there is an absence of evidence to support the nonmoving party's case." *Id.* at 325.

Fundamentally, "[p]atent eligibility under [Section] 101 presents an issue of law," *Accenture Global Servs., GmbH v. Guidewire Software, Inc.*, 728 F.3d 1336, 1340 (Fed. Cir. 2013), but "[t]his legal conclusion may contain underlying factual issues," *id.* at 1341 (citing *Ultramercial, Inc. v. Hulu, LLC*, 722 F.3d 1335, 1339 (Fed. Cir. 2013) ("[T]he analysis under [Section] 101, while ultimately a legal determination, is rife with underlying factual issues.").

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[5]In connection with the cross-motions respecting statutorily patent-eligible subject matter, each party submitted a report by an expert in solid state physics. The government submitted an expert report by Dr. Martin E. Glicksman, Research Professor of Materials Science & Engineering at the University of Florida and the Allen S. Henry Chair and University Professor of Engineering, Mechanical and Aerospace Engineering at Florida Institute of Technology. *See* Def.'s Mot. App. ("Glicksman Report"), at GA 1-2. Hitkansut submitted an expert report by Dr. David G. Cahill, Department Head, Donald B. Willett Professor of Engineering, Professor of Materials Science and Engineering at the University of Illinois at Urbana-Champaign. *See* Pls.' Cross-Mot. Ex. D ("Cahill Report"), at 1.

Prior to the hearing held on January 14, 2014, Hitkansut had submitted a supplemental expert report by Dr. Cahill in which he sought to clarify a perceived misinterpretation by the government of his initial report. *See* Pls.' Reply to Def.'s Opp'n to Pls.' Cross-Mot. ("Pls.' Reply") Ex. P (Supplemental Decl. of Dr. David G. Cahill), ECF No. 51-6. The government moved to strike Dr. Cahill's supplemental report from the record, or in the alternative, to submit a sur-reply. Def.'s Mot. to Strike, ECF No. 53. The court denied the motion to strike but allowed the government to file a sur-reply. Order of Jan. 14, 2014, ECF No. 56. With the sur-reply in hand, all briefing related to the parties' cross-motions is now complete.

Further, in *Ultramercial*, the Federal Circuit explained that "every issued patent is presumed to have been issued properly, absent clear and convincing evidence to the contrary." 722 F.3d at 1338 (citing *CLS Bank Int'l v. Alice Corp.*, 717 F.3d 1269, 1304-05 (Fed. Cir. 2013) (Rader, C.J., and Linn, Moore, & O'Malley, JJ., concurring in part and dissenting in part) ("[A]ny attack on an issued patent based on a challenge to the eligibility of the subject matter must be proven by clear and convincing evidence."), *cert. granted sub nom. Alice Corp. v. CLS Bank Int'l*, No. 13-298, __ U.S. __, 134 S. Ct. 734 (Dec. 6, 2013)). In *Ultramercial*, the trial court had granted the defendant's motion to dismiss for failure to claim statutory subject matter without first conducting claim construction because there was no "reasonable construction that would bring the patent within patentable subject matter." *Id.* at 1349 (internal citations and quotations omitted). The Federal Circuit disagreed with the standard applied by the trial court, stating that to grant a motion to dismiss for failure to claim statutory subject matter, "the only plausible reading of the patent must be that there is clear and convincing evidence of ineligibility." *Id.* at 1339 (emphasis omitted). Thus in a motion to dismiss, the burden rests on the defendant to show by clear and convincing evidence that the claims are patent ineligible. *Id.* at 1349 ("The district court erred in requiring the patentee to come forward with a construction that would show the claims *were* eligible." (emphasis in original)).

The clear and convincing standard of proof also applies on summary judgment. *See Liberty Lobby*, 477 U.S. at 254 (holding that when deciding a motion for summary judgment, a court must bear in mind the applicable evidentiary burden under the substantive law); *Laughing Rabbit, Inc. v. National Auto. Parts Ass'n*, No. C12-0402JLR, 2014 WL 556007, at *3 (W.D. Wash. Feb. 11, 2014); *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, __ F. Supp. 2d __, No. C11-06391 SI, 2013 WL 5863022, at *4 (N.D. Cal. Oct. 30, 2013); *Island Intellectual Prop. LLC v. Deutsche Bank AG*, No. 09 Civ. 2675 (KBF), 2012 WL 386282, at *2 (S.D.N.Y. Feb. 6, 2012); *Medicis Pharm. Corp. v. Acella Pharms. Inc.*, No. CV 10-1780-PHX-JAT, 2011 WL 5321007, at *4 (D. Ariz. Nov. 3, 2011). Generally, "[a] patentee has no burden to present factual evidence affirmatively establishing the validity of its patent, even in support of its own motion for summary judgment on the validity issue." *Laughing Rabbit*, 2014 WL 556007, at *3 (citing *Massey v. Del Labs., Inc.*, 118 F.3d 1568, 1573 (Fed. Cir. 1997)). But, to withstand a motion for summary judgment brought after claim construction and after some showing of ineligibility by the moving party, the patent holder may be required to come forward with a construction supporting the eligibility of the claims. *See Accenture Global Servs., GmbH v. Guidewire Software, Inc.*, 800 F. Supp. 2d 613, 618 (D. Del. 2011), *aff'd*, 728 F.3d 1336. Nonetheless, the defendant (here the government) challenging patentability under Section 101, retains the burden of proving the defense by clear and convincing evidence, *see Laughing Rabbit*, 2014 WL 556007, at *6, particularly as to the underlying factual underpinnings related to statutory subject matter, *see Ariosa Diagnostics*, 2013 WL 5863022, at *4 ("[A]n alleged infringer must prove invalidity by clear and convincing evidence. . . . In this connection, it is the factual evidence itself which must be clear and convincing."); *see also Microsoft Corp. v. i4i Ltd. P'ship*, __ U.S. __, __, 131 S. Ct. 2238, 2253 (Breyer, J. concurring) ("[T]he evidentiary standard of proof applies to questions of fact and not to questions of law. . . . Thus a fact finder must use the 'clear and convincing' standard where there are [factual] disputes." (internal citation omitted)).

ANALYSIS

Section 101 concisely states,

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

35 U.S.C. § 101. Unfortunately, this brevity has led to murky jurisprudence. Generally, Section 101 has been interpreted broadly in accord with perceived congressional intent. *See Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980) ("In choosing such expansive terms as 'manufacture' and 'composition of matter,' modified by the comprehensive 'any,' Congress plainly contemplated that the patent laws would be given wide scope."). That said, the Supreme Court has developed three categories of subject matter that are patent ineligible under Section 101, *viz.*, laws of nature, natural phenomena, and abstract ideas. *Diamond v. Diehr*, 450 U.S. 175, 185 (1981). These judicially created exceptions constrain patents that "reach too far and claim too much" and risk "obstructing rather than catalyzing innovation." *CLS Bank*, 717 F.3d at 1277 (plurality opinion). At the same time, "too broad an interpretation of this exclusionary principle could eviscerate patent law. For all inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas." *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, ___ U.S. ___, ___, 132 S. Ct. 1289, 1293 (2012). Notably, a challenge under Section 101 must rely on one or more of these three enumerated exceptions to patent eligibility. Challenges of novelty and nonobviousness, for example, are not properly brought under Section 101. *See CLS Bank*, 717 F.3d at 1276.[6] Predictably, however, no sharp, bright line demarcates what is not patentable within one of the exceptions to Section 101.

The government asserts that the claims in the '722 patent are ineligible because they embody a law of nature, a natural phenomenon, or an abstract idea. Def.'s Mot. at 5. There is no doubt that the claims at issue in this patent rest upon employing the well-known (at least to materials engineers and solid-state physicists) Larson-Miller relationship, but Hitkansut asserts that use of the mathematical equation describing that relationship is but a step in this new and inventive process. Pls.' Cross-Mot. at 23-24.[7] The Federal Circuit has recognized that

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[6]35 U.S.C. § 102 prescribes "Conditions for patentability; novelty" (heading), and 35 U.S.C. § 103 specifies "Conditions for patentability; non-obvious subject matter" (heading).

[7]During claim construction, the court defined the Larson-Miller relationship to mean "a parametric representation of a system of physical properties of a structure subjected to energy processes, which can take the form of the equation $P = \frac{\Delta H}{R} = T(C + \log t)$." *Hitkansut II*, 114 Fed. Cl. at 426. The Larson-Miller relationship "is a variant of the Arrhenius equation as applied in physics rather than chemistry," *id*. at 420, and stems from a seminal paper, F. R. Larson and James Miller, *A Time-Temperature Relationship for Rupture Creep Stresses*, Transactions of ASME, pp. 765-775 (July 1952), that reported test results on a number of metallic alloys for the purpose of addressing turbine blade life, *Hitkansut II*, 114 Fed. Cl. at 419 n.8.

In defining this term, the court recognized that the relationship can be derived from plots of experimental data, as well as from the equation. *Id.* at 425. For quotidian application,

"difficulty lies in consistently and predictably differentiating between, on the one hand, claims that would tie up laws of nature, natural phenomena, or abstract ideas, and, on the other, claims that merely 'embody, use, reflect, rest upon, or apply' those fundamental tools." *CLS Bank*, 717 F.3d at 1277 (quoting *Mayo*, __ U.S. at __, 132 S. Ct. at 1293). That is the differential analysis before the court.

A. Supreme Court Precedent

Five key Supreme Court cases in this area inform the court's assessment of the patent eligibility of the claims at issue in this case.

1. Gottschalk v. Benson.

In 1972, the Supreme Court decided *Gottschalk v. Benson*, 409 U.S. 63 (1972). The patent applicant claimed a "method of programming a general-purpose digital computer to convert signals from binary-coded decimal form into pure binary form." *Benson*, 409 U.S. at 65. The method consisted of an algorithm that could be used to solve the mathematical problem of converting one form of numerical representation to another. *Id*. Although the patent applicant "discovered" the mathematical formula, the court held that even a previously unknown mathematical formula could not be patented. *Id*. at 67-68; *see also Parker v. Flook*, 437 U.S. 584, 585 (1978) (explaining the Court's holding in *Benson*). The claimed method did not require use of a new technology and could be performed by hand. *Benson*, 409 U.S. at 67. Moreover, use of the algorithm was not confined to any particular field or specific use. *Id*. at 64. The Court described the claim for which a patent was sought as "so abstract and sweeping as to cover both known and unknown uses of the [binary-coded decimal] to pure binary conversion." *Id*. at 68. The Court discussed a number of prior cases, including Samuel Morse's patent application, explaining that Morse's last-stated claim had been held to be ineligible because it could conceivably have prohibited all future inventions relying on "electromagnetism, however developed, for marking or printing intelligible characters, signs, or letters, at any distances." *Id*. Contrastingly, his other claims more specific to using electromagnetism to produce distinguishable signs for telegraphy, were patent eligible. *Id*.

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the chief practical problem appears to be defining the constants for the equation. There is imprecision in the Larson-Miller relationship because of built-in assumptions, as the plaintiffs' expert recognized, stating,

> The Larson[-]Miller relationship assumes that the rate of creep is independent of time and that this steady-state creep rate is described by an Arr[he]nius relationship. While this description is often a good approximation and certainly of great utility, there is no fundamental reason that the creep rate must be independent of time, or that the activation energy must be independent of time, or that the 'modified rate constant' must be independent of time."

Cahill Report at 3. For purposes of this opinion, the phrases "Larson-Miller relationship" and "Larson-Miller equation" will be used interchangeably.

2. *Parker v. Flook.*

Six years later, the Court decided *Flook*, a case in which an applicant sought to patent a method of updating "alarm limits" during catalytic conversion of hydrocarbons. 437 U.S. at 586. An alarm limit is a set number beyond which an alarm may signal the "presence of an abnormal condition indicating either inefficiency or perhaps danger." *Id*. at 585. During certain processes, operating conditions such as temperature, pressure, and flow rates are constantly monitored to ensure they do not exceed the assigned alarm limits. *Id*. Often, the alarm limit must be continually updated throughout the process. *Id.* The patent application described a three-step method for updating alarm limits, consisting of: (1) measuring the present value of a condition, (2) plugging that value into an algorithm developed by the applicant to calculate an updated alarm-limit value, and (3) adjusting the alarm-limit to the updated value. *Id.* The Court concluded that the method was not patentable. *Id*. at 594. It found that the only addition to the prior art was using this mathematical formula to update the alarm limits throughout the process. *Id.* at 585-86, 594-95. The Court rejected the applicant's argument that his method, unlike the method at issue in *Benson*, was patent eligible due to the presence of a specific post-solution activity (updating the alarm limit) and a limitation to a particular field (the catalytic chemical conversion of hydrocarbons in the petrochemical and oil-refining industries). *Id*. at 589-90. The Court analyzed the claimed method by asking whether, assuming the mathematical formula had been well-known, the applicant had invented a mode of applying it. *See id.* at 592 (citing the English case of *Neilson v. Harford*, (1844) 151 Eng. Rep. 1266 (L.R. Exch.) 1273-74; 1 Web. Pat. Cases 295, 371). While acknowledging that a claim does not become ineligible simply because it makes use of a law of nature or a mathematical algorithm, *id.* at 590, the Court found that without the algorithm, the application considered as a whole contained no patentable invention, *id.* at 594. The practice of monitoring chemical processes and updating alarm limits was already well-known. *Id.* at 594-96.

3. *Diamond v. Diehr.*

The next decision *Diehr*, is of particular importance to this case because of the five key cases, it is the sole instance where the Court held that that the claimed invention, which made heavy use of a known algorithm, contained sufficient extra steps to constitute eligible subject matter. 450 U.S. at 184. It also, as here, pertains to a specific application of the Arrhenius equation. *Id*. at 177 & n.2. In *Diehr*, the claims related to "a process for molding raw, uncured synthetic rubber into cured precision products." *Id*. at 177. The rubber industry had been unable to uniformly and accurately cure rubber because there was no means to measure precisely the temperature inside the molding press, making it difficult to determine a specific mold time. *Id.* at 177-78. The method at issue in the patent consisted of using a thermocouple to continuously measure the actual temperature inside the mold and feeding that information to a computer, which would use it to continually re-solve the Arrhenius equation to determine an accurate curing time and then send a signal from the computer to open the mold once that time had been reached. *Id.* at 178-79. Although solving the Arrhenius equation was essential to the process and an application of the equation alone would be ineligible subject matter, the Court held that the series of other specific steps related particularly to curing rubber rendered this specific use of the equation patent eligible. *Id.* at 187. The Court left open the question of whether the process might validly be attacked on grounds of lack of novelty under Section 102 or obviousness under

Section 103. *Id*. at 191 (referring to 35 U.S.C. §§ 102, 103).

In sum, *Diehr* held that "when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (*e.g.*, transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of [Section] 101." 450 U.S. at 192. The court distinguished *Flook* on the ground that the claims in *Flook* did not "explain how the variables used in the formula were to be selected, nor did the application contain any disclosure relating to chemical processes at work or the means of setting off an alarm or adjusting the alarm limit." *Id.* at 192 n.14.

   4. Bilski v. Kappos.

More recently, in 2010, the Supreme Court revisited its jurisprudence regarding Section 101 in *Bilski v. Kappos*, __ U.S. __, __, 130 S. Ct. 3218 (2010). In *Bilski*, the patent applicant sought to patent "a claimed invention that explain[ed] how buyers and sellers of commodities in the energy market c[ould] protect, or hedge, against the risk of price changes." __ U.S. at __, 130 S. Ct. at 3223. Claim 1 of the patent described a series of instructions explaining how to hedge risk, and Claim 4 transformed those steps into a mathematical formula. *Id.* The Court held the claims to be an abstract idea and thus ineligible subject matter. *Id*. at __, 130 S. Ct. at 3231. In doing so, it rejected a machine-or-transformation test applied by the Federal Circuit. *See id.* at __, 130 S. Ct. at 3225-29. A majority of the Federal Circuit had proposed that a process or method could only be patent eligible if it was "tied to a particular machine or apparatus" or it "transformed a particular article into a different state or thing," *In re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2008), but the Supreme Court held that this postulated test was too limited and at odds with Congressional intent, *Bilski*, __ U.S. at __, 130 S. Ct. at 3227. The Court acknowledged that the Federal Circuit's machine-or-transformation test, however, "may well provide a sufficient basis for evaluating processes similar to those in the Industrial Age — for example, inventions grounded in a physical or other tangible form." *Id.*[8] Ultimately, the court held that any explanation regarding how to hedge risk merely described an abstract idea, and was therefore patent ineligible. *Id*. at __, 130 S. Ct. at 3229-30. The Court emphasized that its holding was intended to be narrow and based on its prior decisions in *Benson*, *Flook*, and *Diehr*. *Id*. at __, 130 S. Ct. at 3229.[9]

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[8]Conceptually, the machine-or-transformation test had been applied in *Diehr*, which had stated that "transformation and reduction of an article to a different state or thing is *the clue* to the patentability of a process claim that does not include particular machines." 450 U.S. at 184 (emphasis added) (internal citations and quotations omitted). The "clue" was derived from an early case in the Supreme Court, *Cochrane v. Deener*, 94 U.S. 780 (1876), in which the Court approved the patentability of a process for milling superfine flour by a method of separating impurities and middlings-meal from the flour, separating the impurities from the middlings-meal, and then regrinding the middlings. 94 U.S. at 785. The improved process was said by the Court to be patentable without regard to any special arrangement of machinery. *Id*.

[9]The Court also rejected a proposal to declare all business methods to be ineligible. *Id.* at __, 130 S. Ct. 3228-29.

5.   *Mayo v. Prometheus.*

As of this writing, the Supreme Court's latest decision is *Mayo*, __ U.S. __, 132 S. Ct. 1289.[10] The claim at issue concerned a process to help doctors determine whether a given dosage of a thiopurine drug was too low or too high. *Id*. at __, 132 S. Ct. at 1294. "The claims purport[ed] to apply natural laws describing the relationships between the concentration in the blood of certain thiopurine metabolites and the likelihood that the drug dosage will be ineffective or induce harmful side-effects." *Id*. Individuals metabolize thiopurine compounds at different rates, so effective dosing requires individual measurements. *Id*. at __, 132 S. Ct. at 1295. The patented "invention" was the precise identification of correlations between the level of a metabolite's presence in a patient's bloodstream and the appropriateness of the given thiopurine drug dosage. *Id*. Prometheus Labs, the patent holder, sold diagnostic tests that embodied the patented process. *Id*. Mayo purchased these diagnostic tests until it developed its own diagnostic test to determine metabolite levels and recommend an increase or decrease in dosage. *Id*. at __, 132 S. Ct. at 1295-96.

The Federal Circuit had held the claims were patent eligible because they specified certain steps apart from the natural law, such as administering a thiopurine drug and determining the resulting metabolite level. *Prometheus Labs., Inc. v. Mayo Collaborative Servs.*, 628 F.3d 1347, 1354-55 (Fed. Cir. 2010). The Supreme Court reversed, determining that the "extra steps" identified by the Federal Circuit were insufficient to transform the unpatentable natural law of how an individual clinically responds to a certain drug into a patent-eligible application of that law. *Mayo*, __ U.S. at __, 132 S. Ct. at 1297-98. These extra steps only involved "well-understood, routine, conventional activity previously engaged in by researchers in the field." *Id*. at __, 132 S. Ct. at 1294. The government, as amicus curiae, argued that the claims were patent eligible, but should fail under the patentability requirements of Sections 102 and 103. *Id*. at __, 132 S. Ct. at 1303. The court rejected this argument, stating that such an approach would render the law-of-nature exception to Section 101 a "dead letter" and was inconsistent with prior decisions. *Id*.

6.   *Synopsis.*

The Federal Circuit recently identified four basic themes running through these cases. First, patentees should not be allowed to preempt the fundamental tools of scientific discovery. *CLS Bank*, 717 F.3d at 1280-81 (plurality op.) ("What matters is whether a claim threatens to subsume the full scope of a fundamental concept, and when those concerns arise, we must look for meaningful limitations that prevent the claim as a whole from covering the concept's every practical application."); *see also Mayo*, __ U.S. at __, 132 S. Ct. at 1301 ("The Court has repeatedly emphasized . . . a concern that patent law not inhibit further discovery by improperly tying up the future use of laws of nature."). Second, subject-matter eligibility should not rest on a patent draftsman's skill, *i.e.*, patent ineligible subject matter cannot be rendered eligible by "highly stylized language, hollow field-of-use limitations, or the recitation of token post-solution activity." *CLS Bank*, 717 F.3d at 1281 (plurality op.). Third, a claim-by-claim approach that

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[10]The Supreme Court granted certiorari in *CLS Bank* and heard oral arguments on March 31, 2014.

avoids "rigid line drawing" is most appropriate. *Id*. Lastly, the court must consider each claim as a whole and not engage in dissecting the claims into components. *Id*. at 1298 (Rader, C.J. and Linn, Moore & O'Malley, J.J., concurring in part and dissenting in part); *see also Diehr*, 450 U.S. at 189 ("It is inappropriate to dissect the claims into old and new elements and then to ignore the presence of old elements in the analysis.").

B.   *The Claims in This Case*

Independent claims 1, 7, 11, and 14 of the '722 patent are at issue.[11] The government asserts that each of these independent claims addresses nonstatutory subject matter because, as written, they constitute nothing more than a recitation of the Larson-Miller relationship and then a direction to "apply it." Def.'s Mot. at 6-7. Although the government engaged in a claim-by-claim analysis, its conclusions for each claim remain the same. *See* Def.'s Mot. at 22-39. The government also asserts that even the most detailed claim, Claim 1, is insufficiently limited and risks preempting both known and unknown uses of the underlying natural law. Def.'s Mot. at 23-24.

Hitkansut on the other hand points to the presumption that a patent is validly granted and asserts that the patented claims set out a new and useful method as shown by ongoing efforts by Oak Ridge to commercialize the method. Pls.' Cross-Mot. at 3, 7. According to plaintiffs, "[t]he claims of the '722 [p]atent merely employ the Larson-Miller relationship to assist in determining the conditions at which to apply the inventive process for improving the properties of manufactured metal structures in an accelerated manner through the simultaneous application of two energy sources." *Id*. at 22.[12] Hitkansut seeks to refute the government's argument that the patent risks broadly preempting use of the Larson-Miller relationship by stating that the Larson-Miller relationship is only used as a guideline in applying multiple energy processes "in order to reach a desired useful and unexpected result." *Id*. at 18.

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[11]Regarding the other claims in dispute, Claims 2 and 6 are dependent upon Claim 1, and Claim 8 is dependent upon Claim 7.

[12]Supported by the patent specification, Hitkansut makes repeated references to the purpose of the invention as being to improve the physical properties of metal structures. *See, e.g.*, Pls.' Cross-Mot. at 21 ("[T]he claims . . . cover a process where two different energy sources are used to accelerate changes to the physical and mechanical properties of a metal structure."). This emphasis narrows the breadth and scope of the claims beyond the court's claim construction. The court previously recognized that the claims are not limited to metallic structures. Specifically, the term "structure" as used in the claims was defined to mean "a physical object that has been constructed or manufactured and to which the claimed invention is applied." *Hitkansut II*, 114 Fed. Cl. at 416. Similarly, plaintiffs' references to "acceleration" contradict the court's construction of the terms at issue, because the court rejected inclusion of acceleration in construing the claim terms, as discussed *infra*, at 16-17. *See Hitkansut II*, 114 Fed. Cl. at 421. These divergent aspects of plaintiffs' briefs, however, do not affect the outcome of the pending cross-motions for summary judgment.

These counter-arguments will be addressed on a claim-by-claim basis beginning with independent Claim 14 in the '722 patent.

    1. *Claim 14.*

Claim 14 describes:
> [1] A method of determining operational settings and time values for concurrent application of multiple energy forms to a structure to change a physical property of the structure, the method comprising:
> [2] determining a first parameter according to a desired physical property value for the structure and according to a first order rate relationship for a first energy process that relates application of a first energy to the structure and the physical property;
> [3] determining a second parameter according [to] the desired physical property value and according to a first order rate relationship for a second energy process that relates application of a second energy to the structure and the physical property;
> [4] selecting a first one of a time value and an operational setting for the first energy process; and
> [5] selecting a second one of the time value and the operational setting according to the first and second parameters, according to the first order rate relationship for the first energy process, and according to the first one of the time value and the operational setting;
> [6] wherein the first order rate relationship for the first energy process is a first Larson[-]Miller relationship that relates application of the first energy to the structure and the physical property, and wherein the first order rate relationship for the second energy process is a second Larson[-]Miller relationship that relates application of the second energy to the structure and the physical property.

'722 patent, Claim 14.

The first clause of the claim accurately describes it. Claim 14 is a method for determining variables in the Larson-Miller relationship that would guide the application of two energy processes to a structure. The claim, however, never directs any application of specific energy processes, nor does it focus on what "physical property" is to be changed on what type of "structure." As such, Claim 14 essentially seeks to patent a method for solving the Larson-Miller relationship, "a case specific derivation of the well-known . . . Arrhenius equation, $r = A'e^{-\frac{E_a}{R_gT}}$." Def.'s Mot. at 2; *see also* Def.'s Mot. at 39.

According to clauses two and three of this claim, two "parameters" – one for each energy process – are separately determined according to a desired physical property value for the structure and a "first order rate relationship" related to the application of the energy process to the structure, which in this claim is defined as a Larson-Miller relationship. The parameters are then used to determine the "operational settings and time values for concurrent application of multiple energy forms to a structure to change a physical property of the structure." '722 patent,

Claim 14, clause 1. The court agrees with the government that Claim 14 merely describes how to determine the variables in the Larson-Miller relationships.

This claim consequently exhibits the same characteristics as those held to be ineligible in *Benson* and *Flook*. In *Benson*, the mathematical formula for conversion of binary-coded decimal to pure binary form was nothing other than an algorithm, even if only recently discovered, and an algorithm cannot be patented. 409 U.S. at 68. In *Flook*, the court rejected the patent applicant's attempt to patent a mathematical formula for updating alarm limits during catalytic conversion of hydrocarbons. 437 U.S. at 594. The court explained that the "patent application does not purport to explain how to select the appropriate margin of safety, the weighting factor, or any of the other variables. Nor does it purport to contain any disclosure relating to the chemical processes at work, the monitoring of process variables, or the means of setting off an alarm or adjusting an alarm system." *Id*. at 584. In this case, while Claim 14 arguably attempts to explain how to select variables, it does so only by directing the selection of a desired physical property of a structure (clauses 2 and 3) and an operational setting or time value (clause 4) and then directing the solution of the Larson-Miller relationship for the unknown variable (clause 5). There is no further explanation of how to use the equation to achieve any specified outcome. Equations are ineligible, in part, because of the fear that it could stifle invention – both known and unknown uses of an equation would be barred. *See Benson*, 409 U.S. at 68. Moreover, the Supreme Court has acknowledged that claims purporting to patent nothing more than application of an equation, even in a specified field, are unlikely to be eligible. *Flook*, 437 U.S. at 590 ("The notion that post-solution activity, no matter how conventional or obvious in itself, can transform unpatentable principle into a patentable process exalts form over substance."). Claim 14 falls well within the prohibition on patenting calculations of mathematical formulae.

   2. Claims 1, 7, and 11.

The remaining claims rely heavily on use of the Larson-Miller relationship, and the inquiry becomes whether any of the remaining claims contain sufficient inventive aspects, post-solution activity, or limiting steps to turn "unpatentable principle into a patentable process." *Flook*, 437 U.S. at 590. In *Mayo*, although ultimately holding a clinical diagnostic method to be ineligible, the Supreme Court acknowledged that a law of nature can be transformed into a patent-eligible application of such a law, but this requires more than "simply stat[ing] the law of nature while adding the words 'apply it.'" __ U.S. at __, 132 S. Ct. at 1294. Presumably the Court's logic reaches all of the judicially created exceptions to Section 101, including mathematical formulae.

Notably, Claims 1, 7, and 11 all detail "a method of changing a physical property of a structure," as compared to Claim 14, which explicitly relates to a method for determining operational settings and time values. In *Bilski*, while the Supreme Court rejected the Federal Circuit's attempts to create a per se "machine-or-transformation" test to determine patent eligibility under Section 101, the Court did opine that a transformation or use with a machine could be a "useful clue," to patent eligibility but was too limiting. *Bilski*, __ U.S. at __, 130 S. Ct. at 3226. Such a clue would have particular utility "for evaluating processes similar to those in the Industrial Age." *Id*. at __, 130 S. Ct. at 3227. The Supreme Court considered that a claim may be eligible even if it does not satisfy the machine-or-transformation test. *Id.* The Court

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made no comment on whether something that *does* satisfy the machine-or-transformation test might be ineligible under Section 101 for other reasons. In *Mayo*, however, the Court elaborated that even though the machine-or-transformation test is an important and useful clue, it does not "trump[] the 'law of nature' exclusion." __ U.S. at __, 132 S. Ct. at 1303.

The government argues that the series of limiting steps that appear in Claims 1, 7, and 11 are nothing more than "providing" steps consisting of conventional post-solution activity. Def.'s Mot at 6. According to the government, this conventional post-solution activity is wholly insufficient to convert a patent-ineligible equation into a patent-eligible application of it. *Id*. In this respect, the court acknowledges that the government correctly identifies a key determination to be made, *i.e.*, whether the claims at issue are more like those in *Flook* or *Diehr*, *id*. at 12. Both prior cases involved method claims related to physical processes, similar to the claims at issue here, but the Supreme Court reached differing conclusions. *Id*. at 11-16.

(a.) *Claim 7.*

Claim 7 provides:

A method of changing a physical property of a structure, comprising:
      [1] providing a first energy to a structure by performing a first energy process according to an operational setting, at least one of the operational setting and a time value being selected according to a first order rate relationship for the first energy process, according to a first order rate relationship for a second energy process, and according to a desired physical property value; and
      [2] providing a second energy to the structure by performing the second energy process;
      [3] wherein the first and second energy processes are performed concurrently for at least the time value;
      [4] wherein the first order rate relationship for the first energy process relates application of the first energy to the structure and a physical property of the structure;
      [5] wherein the first order rate relationship for the second energy process relates application of the second energy to the structure and the physical property;
      [6] wherein the first and second energy are different;
      [7] wherein the total energy provided to the structure by the first and second energy processes is above an activation energy for the material of the structure; and
      [8] wherein the first order rate relationship for the first energy process is a first Larson[-]Miller relationship that relates application of the first energy to the structure and the physical property, and wherein the first order rate relationship for the second energy process is a second Larson[-]Miller relationship that relates application of the second energy to the structure and the physical property.

'722 Patent, Claim 7.

Claim 7 describes a method of concurrently applying two energy processes to a structure with each energy process governed by a separate Larson-Miller relationship. Clauses 4 and 5 expressly state that each energy process is governed by a separate Larson-Miller relationship. Using the Larson-Miller relationship in this straightforward manner is not an inventive concept; it amounts to no more than reciting an unpatentable equation and then stating, "apply it," which was expressly ruled inappropriate by the Supreme Court in *Mayo*. *See Mayo*, __ U.S. at __, 132 S. Ct. at 1294. The inclusion of the concurrent application of the energy processes adds little or nothing to the patentability evaluation because the claim attributes no special consequences to concurrent application. Claim 7 thus is ineligible for patent protection.

(b.)   *Claims 11 and 1.*

Claims 11 and 1 are conceptually distinct from Claims 14 and 7. The government claims that the entirety of the '722 patent "amounts to nothing more than the discovery . . . that a predictable relationship exists between the application of multiple energies to a material and the changes in the physical properties of that material." Def.'s Reply to Pls.' Cross-Mot. & Resp. ("Def.'s Reply") at 4. In support, the government points to the expert report submitted by the plaintiffs' expert, Dr. Cahill, who stated that Ms. Walker "discovered the fact that accelerated kinetics produced by an oscillatory strain can be described by a modification of the Larson[-]Miller relationship." *Id.* (citing the Cahill Report at 4). According to the government, its expert, Dr. Glicksman, took the position that the '722 patent "describe[s] conventional and well-known principles of materials engineering, [*i.e.*], that the application of energies to a material will alter certain physical properties of the material in a predictable manner." Def.'s Reply at 4 (indirectly referring to the Glicksman Report at GA 17). Independent Claims 1 and 11, however, do not merely restate straightforward applications of the known Larson-Miller relationship. The Larson-Miller relationship itself does not predict that *concurrent application of two energy processes* according to a *combined* first order rate relationship is a more efficient method of changing the physical properties of a structure.

Claim 11 most directly states the innovation in Ms. Walker's claimed method. It describes:

> A method of changing a physical property of a structure, comprising:
>   [1] providing a first energy to a structure by performing a first energy process according to an operational setting;
>   [2] providing a second energy to the structure by performing a second energy process;
>   [3] wherein the first and second energy processes are performed concurrently to provide energy above an activation energy for the material of the structure for at least a time value;
>   *[4] wherein one of the operational setting and the time value are selected according to a desired physical property value and according to a first order rate relationship that relates concurrent application of the first and second energy to the structure and the physical property of the structure; and*

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> [5] further comprising determining the Larson[-]Miller relationship that relates concurrent application of the first and second energy to the structure and to the physical property of the structure.

'722 patent, Claim 11 (emphasis added). Clause 4 describes the use of a single "first order rate relationship that relates concurrent application of the first and second energy to the structure and the physical property of the structure" to determine the operational setting and the time value. '722 patent, Claim 11, clause 4. By combining the two energy processes into a single first order rate relationship, the patent claims that the process can be more efficient by expending less energy or requiring less time, or both. *See* '722 patent, col. 2, lines 33-38 ("The concurrent provision of multiple energy types in accordance with the present invention may be advantageously employed to significantly reduce the time and/or energy required to change a physical property of interest, such as reducing remaining internal stress in manufactured parts or other structures, compared to previous technologies.") The patent specification gives explicit examples of the practicability obtained by using concurrent applications of energy. One such example disclosed stress relief on aluminum samples treated with thermal and vibrating energy. *See* '722 patent, col. 17, line 52 through col. 18, line 26. The specification reported that "the inventive process, in four minutes, stress-relieves the fourth sample[, the one treated with concurrent energies,] sufficiently to meet the desired stress reduction goal in less time than either the vibration only or the thermal only techniques of the other samples." '722 patent, col. 18, lines 22-26. The specification additionally lists a series of advantages that may result from the concurrent application of energies to a structure, including being able to reduce applied temperatures, "*e.g.*, keeping the structure temperature below melting or other critical temperatures for the structure material," or "without melting or altering the temper of the material," and nonetheless obtaining desired physical changes to the material. '722 patent, col. 15, lines 57-58, line 62.

This concept, while largely reliant on the Larson-Miller relationship, discloses a new and more efficacious method of applying it. *See Mayo*, __ U.S. at __, 132 S. Ct. at 1293 ("'[A]n *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.'" (quoting *Diehr*, 450 U.S. at 187) (emphasis in original)).[13] In *Diehr*, the underlying mathematical equation that determined at what point in the process a rubber mold should be opened was not patent eligible, but a method for applying that equation more accurately and effectively was eligible. *Diehr*, 450 U.S. at 187. The same concept applies here – a more effective method of using the pre-existing, unpatentable Larson-Miller relationship may be patent eligible.

The specification focuses on the desired physical property of the structure in elaborating on the claimed enhanced effect of using a first order rate relationship that relates concurrent

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[13]Dr. Glicksman acknowledges that his examples of existing processes that make use of concurrent application of multiple energy processes are not the same as the application of concurrent energy processes generally reliant upon the Larson-Miller relationship. *See* Glicksman Report at GA 17.

application of at least two different energy processes.[14] For ease of explanation, the court will adopt the notation "P," as used in the specification and the Larson-Miller relationship, to denote the desired physical property of the structure. As the specification explains,

> [T]he first L[arson-M[iller ("L-M")] parameter may be determined according [to] a first L-M relationship ([*e.g.*], L-M curve, etc.), wherein a desired remaining internal stress value is selected along the Y axis of the first L-M curve, and the corresponding parameter ("P") value is ascertained along the X axis (P_1). A second L-M parameter is determined for the desired physical property value according to a second L-M relationship ([*e.g.*], a second L-M curve) by locating the desired internal stress value on the Y axis of the second L-M curve, and locating the corresponding second parameter value ([*e.g.*], P_2) along the X axis. A third L-M parameter ([*e.g.*], P_3) may optionally be determined according to the first and second L-M parameters (P_1 and P_2), such as by subtraction ([*e.g.*], $P_3 = P_1 - P_2$). An operational setting and a time value are then selected according to [P_3] . . . .

'722 patent, col. 3, lines 21-36. Determining P_3 and using it to choose an operational or time setting is often described as an "optional" step in the specification, *see, e.g.*, '722 patent, col. 7, lines 24-25; col. 3, lines 32-34, but P_3 is the key product of concurrent application of two energy processes. It reflects a single, combined first order rate relationship that can more efficiently transform the physical properties of a structure to relieve stress or defects. *See* '722 patent, col. 7, lines 28-36. Consequently, claims that make use of P_3, *e.g.*, Claim 11, constitute or state more than mere limiting steps or conventional post-solution activity.[15]

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[14]*Accenture* prohibits reading limitations from a specification into an otherwise ineligible claim in order to render it eligible. *Accenture*, 728 F.3d at 1345 ("[T]he level of detail in the specification does not transform a claim reciting only an abstract concept into a patent-eligible system or method."). In considering the specifications in this case, the court is using them to assist in understanding the language of the claims themselves, not to ascribe limitations on the claims that are not present in the text.

[15]Reduced to very simple terms, conceptually, both experts postulated that "the activation energy barrier for [desired physical changes] can be decreased from that existing under a thermal fill (temperature) alone," with the consequence "that the process rate is enhanced." Glicksman Report at GA 12; *see* Cahill Report at 4 (referring to a modification in the energy required through the addition of a second form of energy). Having said as much, Dr. Glicksman refers to this result as one obtainable "per the predictions provided by the Boltzman-Arrhenius relationship," Glicksman Report at GA 12, and as "a direct[] and straight forward mathematical extension of the classical Larson-Miller time-temperature equivalency method for correlating stress-rupture failures," *id*. at GA 16. In Dr. Glicksman's view, the "results . . . should appear obvious to someone reasonably skilled in metallurgical kinetics and the prior analysis and publication of Larson and Miller." *Id*. Dr. Cahill on the other hand, opines "that the inventor of the '722 patent has discovered the fact that accelerated kinetics produced by an oscillatory strain

The specification uses the word "acceleration" with reference "to chang[ing] a physical property of a structure in less time and using less energy than was possible using previous methods." '722 patent, col. 7, lines 32-36. During claim construction the court explicitly rejected the inclusion of "acceleration" into construed Term 7 of the patent. *Hitkansut II*, 114 Fed. Cl. at 421. Construed Term 7, which appears in Claims 1 and 7, states, "At least one of the operational setting and a time value being selected according to a first order rate relationship for the first energy process, according to a first order rate relationship for a second energy process, and according to a desired physical property value." *Id*. The court rejected the plaintiff's proposed definition, which included the goal of "temporal acceleration in the desired physical property value" because it appeared nowhere in the term or in the claims. *Id*.[16] Efficiency, however, need not be a factor of time (acceleration), but could also be a decrease in total energy expended. *See* Glicksman Report at GA 12 (noting that the Larson-Miller relationship and the Boltzmann-Arrhenius rate relationship rely on the "fundamental notion of time-temperature equivalence").

Claim 1 is similar to Claim 11 in that it relies on use of a combined first order relationship relating concurrent application of two energy processes to a desired physical property value, as compared to Claims 7 and 14, which both direct calculation of time values and operational settings by using two separate Larson-Miller relationships. Claim 1 describes:

A method of changing a physical property of a structure, comprising:
      [1] providing a first energy to a structure by performing a first energy process according to an operational setting, at least one of the operational setting and a time value being selected according to a first order rate relationship for the first energy process, according to a first order rate relationship for a second energy process, and according to a desired physical property value; and
      [2] providing a second energy to the structure by performing the second energy process;
      [3] wherein the first and second energy processes are performed concurrently for at least the time value;
      [4] wherein the first order rate relationship for the first energy process relates application of the first energy to the structure and a physical property of the structure;
      [5] wherein the first order rate relationship for the second energy process relates application of the second energy to the structure and the physical property;

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can be described by a modification of the Larson[-]Miller relationship," and that discovery "is not a trivial extension of a known law of nature" but instead "is both non-obvious and highly useful." Cahill Report at 4.

[16]The court ultimately defined construed Term 7 to mean "choosing a set point or time value for a first order rate relationship for the first energy process and for a first order rate relationship for the second energy process, to achieve a desired physical property value." *Hitkansut II*, 114 Fed. Cl. at 421.

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[6] wherein the first and second energies are different;

[7] wherein the total energy provided to the structure by the first and second energy processes is above an activation energy for the material of the structure;

[8] wherein the first energy is thermal and wherein the second energy is oscillatory;

[9] *wherein the operational setting is a temperature setting, wherein one of the temperature setting and the time value is selected according to the first order rate relationship for the first energy process, according to the first order rate relationship for the second energy process, according to the desired physical property value, and according to the other one of the temperature setting and the time value; and*

[10] wherein the first order rate relationship for the first energy process is a first Larson[-]Miller relationship that relates application of thermal energy to the structure and the physical property, and wherein the first order rate relationship for the second energy process is a second Larson[-]Miller relationship that relates application of oscillatory energy to the structure and the physical property.

'722 patent, Claim 1 (emphasis added). In this claim, for clause 9, the third and fourth "according to" phrases can reasonably be read to limit the method to processes that use a P_3 value to calculate the appropriate operational setting or time value. These phrases — "according to a desired physical property value" and "according to the other one of the temperature setting and the time value" — provide the reference to combination that is lacking in Claim 7. Additionally, Claim 1 is limited to the application of thermal and oscillatory energies to the structure. In this way, it is more limited than Claim 11 and less prone to be overly preclusive of known and unknown uses of applying concurrent energies in accord with a combined Larson-Miller relationship.

C. Synopsis

Claims 1 and 11 are directed to the transformation of a structure using a new method that relies on an inventive manipulation of the phenomena represented by the Larson-Miller relationship. They describe a method of concurrent application of two energy processes to solid manufactured parts to obtain a desired physical property of those structures with more efficiency and indicate that a modified Larson-Miller relationship can be used to characterize that process. The court finds that Claims 1 and 11 do more than recite an equation and direct the application of conventional, known activity. Nonetheless, open questions remain regarding whether Claims 1 and 11 satisfy additional requirements under Section 101 and other sections.[17] Claims 7 and 14,

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[17]In particular, the court acknowledges the government's contentions that the claims are written too broadly and risk preempting an array of processes that rely on the Larson-Miller relationship. *See* Def.'s Mot. at 30; Def.'s Reply at 14-16, 20; *see also Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 869 (Fed. Cir. 2010) ("[T]his court notes that an invention which is not so manifestly abstract as to override the statutory language of [S]ection 101 may nonetheless lack sufficient concrete disclosure to warrant a patent. . . . [A] patent that presents a

however, do not sufficiently distinguish the claimed methods from a straightforward, and unpatentable, calculation and application of the known Larson-Miller relationship.

CONCLUSION

For the reasons stated, the government's motion for summary judgment is GRANTED IN PART AND DENIED IN PART. Specifically, the government's motion is granted as to independent Claims 7 and 14, and by extension, to dependent Claim 8 as well, but denied as to independent Claims 1 and 11, as well as dependent Claims 2 and 6. The plaintiffs' cross-motion for summary judgment is DENIED.

It is so ORDERED.

s/ Charles F. Lettow
Charles F. Lettow
Judge

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process sufficient to pass the coarse eligibility filter may nonetheless be invalid as indefinite because the invention would 'not provide sufficient particularity and clarity to inform skilled artisans of the bounds of the claim.'" (quoting *Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, 537 F.3d 1357, 1371 (Fed. Cir. 2008))).

The Supreme Court is scheduled to hear oral argument in *Nautilis, Inc. v. Biosig Instruments, Inc.* on April 28, 2014, regarding issues that include interpretation of 35 U.S.C. § 112, related to indefiniteness, and 35 U.S.C. § 282(a), related to presumed validity of an issued patent. *See* Pet. for Writ of Certiorari, *Nautilis, Inc. v. Biosig Instruments, Inc.*, No. 13-369.